## **CLAIMS**

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

1	1. A car rental system comprising:
2	a fleet of cars, each of which is operable only when a valid digital key
3	is presented to the car, and each of said fleet of cars has a means to invalidate
4	a digital key; and
5	a management system for handling reservation and car return, said
6	management system including:
7	a key generation system for generating digital keys for renters of the
8	car rental system;
9	a key return system for processing digital keys returned by renters.
1	2. The system in claim 1, further comprising a parking lot guarded by a
2	security gate, said fleet of cars being parked with confines of said parking lot
3	when not rented by a renter of the car rental system, said security gate only
4	opening when a valid digital pass is presented by a renter of the car rental
5	system.
6	3. The system in claim 1, wherein the management system is accessed by a
7	prospective renter over a network and the prospective renter is given a digital
8	key to operate a particular car and a digital pass to open the gate of the parking
9	lot where said particular car is parked, after said prospective renter completes
10	a reservation for said particular car, said digital key and digital pass being
11	effective starting from the time specified by said reservation.

1	4. The system in claim 3, wherein the prospective reflict accesses the
2	management system at a kiosk located in the parking lot where the particular
3	car is parked.
1	5. The system in claim 3, wherein the prospective renter accesses the
2	management system over the Internet.
1	6. The system in claim 3, wherein the key generation system stores a digital
2	key on a storage device provided by a prospective renter.
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1	7. The system in claim 6, wherein the storage device is a smart card.
1	8. The system in claim 6, wherein the digital key comprises car and user
2	identification (ID) signed by the management system to authenticate the
3	digital key.
1	9. The system in claim 1, wherein a renter of a car invalidates a valid digital
2	key upon returning a car to the car rental system and presents an invalidated
3	digital key to the key return system to complete a car return.
1	10. The system in claim 9, wherein the invalidation of a valid digital key
2	includes storing car status information relevant to computing by the key return
3	system a receipt for the renter.
1	11 . A computer implemented method for operating a car rental system
2	comprising the steps of:
3	accessing a reservation server by a prospective car renter to reserve a
4	car;
5	authenticating the prospective car renter by the reservation server and,

6	upon the reservation server successfully authenticating the user, prompting the
7	prospective car renter for the date, time, and location for pickup and return,
8	and the type of car;
9	checking by the reservation server an availability of a requested car
10	and, if a car is available, creating by the reservation server a digital key by car
11	and user information with a digital signature of the reservation server; and
12	downloading the digital key to a portable storage device, the portable
13	storage device being used to gain access to a rental car.
1	12. The method in claim 11, wherein the step of accessing the reservation
2	server is performed via a network.
1	13. The method in claim 12, wherein the network is the Internet.
1	14. The method in claim 11, wherein the step of authenticating a prospective
2	car renter includes the steps of:
3	prompting the prospective car renter to enter a personal identification
4	number (PIN); and
5	comparing the entered PIN with a valid PIN for the prospective car
6	renter.
1	15. The method of claim 11, wherein the step of creating a digital key
2	comprises the steps of:
3	computing a hash of the car renter's valid PIN;
4	combining car and renter identification with the hashed PIN; and
5	digitally signing the combined information by said reservation server.
1	16. The method in claim 11, further comprising the steps of:
2	inserting the portable storage device by a car renter into a slot for

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3	receiving the portable storage device in a rented car;
4	upon detecting the portable storage device inserted into the slot,
5	obtaining by an access controller installed in the rented car the digital key
6	stored on the portable storage device and checking by the access controller
7	whether the digital key is valid and verifying the signature on the digital key;
8	if the digital key is valld and the signature is verified, the access
9	controller then prompting the car renter to enter his or her identification and
10	checking for correctness of the car renter's identification; and
11	if the entered identification for the car renter matches a correct
12	identification on the portable storage device, the access controller activating
13	instruments of the car which the car renter is authorized to have access to.
1	17. The method in claim 16, further comprising the steps of:
2	upon receiving a car renter's request to return a car, prompting the car
3	renter to insert his or her portable storage device into the slot for the portable
4	storage device;
5	obtaining by the access controller car status information and car
6	identification;
7	creating by the access controller a return packet by combining car
8	status information and the current digital key;
9	signing the return packet by the access controller, appending the car
10	identification to the signed return packet, and saving the signed return packet
11	into the portable storage device; and
12	invalidating by the access controller a current digital key.
1	18. The method in claim 17, further comprising the steps of:
2	upon receiving a car renter's request to return a car, retrieving the
3	return nacket from the nortable storage device

verifying a signature on the return packet; and

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- 5 updating the car status and printing a receipt for the car renter.
- 1 19. The method in claim 11, wherein the portable storage device is a smart
- 2 card.

